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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,334	04/29/2004	Hsuan Tso	13031-US-PA	3333

31561 7590 11/17/2004

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER

WILSON, SCOTT R

ART UNIT PAPER NUMBER

2826

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/709,334

Applicant(s)

TSO, HSUAN

Examiner

Scott R. Wilson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,10,14,15,17,18,20 and 21 is/are rejected.
- 7) ☒ Claim(s) 2-9,11-13,16,19 and 22-24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>4/29/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of claims 1-24, and cancellation of claims 25-45 in the response filed 10 October 2004 is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 10, 14, 17, 20 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Rodov et al.. As to claim 1, Rodov et al., Figure 2, discloses a superjunction Schottky device (Abstract) comprising a back metal layer (12), a semiconductor substrate of a first conductivity type (14) on the back metal layer, a plurality of superjunction cells (18) on the semiconductor substrate, including a plurality of charge-balance layers that extend substantially vertically (18), a lightly-doped junction barrier Schottky (JBS) region (16) of the first conductivity type on each superjunction cell, and a front conductor layer (10) over the substrate, contacting with the JBS region to form a Schottky contact with the JBS region (paragraph 0014).

As to claim 10, Rodov et al., Figure 2, discloses that the superjunction cells are arranged adjacent to each other.

As to claim 14, Rodov et al., Figure 2, discloses that each superjunction cell is formed from alternating stripes of n and p doped regions (paragraph 0013). This structure may include a first layer of a second conductivity type, a second layer of the first conductivity type, and a third layer of the second conductivity type arranged in sequence.

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As to claim 17, Rodov et al., Figure 2, discloses that the JBS region comprises a lightly doped region of the first conductivity type (16) over all superjunction cells.

As to claim 20, Rodov et al., paragraph (0015) and Figure 3A, discloses that the superjunction cells (18) are located in an epitaxial silicon layer (30).

As to claim 21, Rodov et al., paragraph (0014) and Figure 2, discloses that the front conductor layer (10) comprises a metal layer forming the Schottky contact with the JBS region.

Claims 1, 10, 14, 15, 17, 18 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Baliga. As to claim 1, Baliga, Figure 5, discloses a superjunction Schottky device comprising a back metal layer (11b), a semiconductor substrate (13) of a first conductivity type on the back metal layer, a plurality of superjunction cells on the semiconductor substrate, one of which is shown illustrated, including a plurality of charge balance layers (14a), (14b), (12) that extend substantially vertically, a lightly doped junction barrier Schottky (JBS) region (22) of the first conductivity type on each superjunction cell, and a front conductor (16) layer over the substrate, contacting with the JBS region to form a Schottky contact with the JBS region.

As to claim 10, Baliga, Figure 5, discloses that the superjunction cells, one of which is shown illustrated, are arranged adjacent to each other.

As to claim 14, Baliga, Figure 5, discloses that each superjunction cell comprises a first layer of a second conductivity type (14a), a second layer of the first conductivity type (12), and a third layer of the second conductivity type (14b) arranged in sequence.

As to claim 15, Baliga, Figure 5, discloses a guard ring (24a), (24b) of the second conductivity type at the periphery of the Schottky contact above the superjunction cell.

As to claim 17, Baliga, Figure 5, discloses that the JBS region (22) comprises a lightly doped region of the first conductivity type over all superjunction cells, one of which is shown in the figure.

As to claim 18, Baliga, in the Abstract, discloses that the doping concentration in the superjunction cell is about $1 \times 10^{17} \text{ cm}^{-3}$.

As to claim 21, Baliga, (col. 7, lines 30-32), discloses that the front conductor layer (16) comprises a metal layer forming the Schottky contact with the JBS region.

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Allowable Subject Matter

Claims 2-9, 11-13, 16, 19 and 22-24 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott R. Wilson whose telephone number is 571-272-1925. The examiner can normally be reached on M-F 8:30 - 4:30 Eastern.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

srw
November 8, 2004


NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800